

## PATENT ABSTRACTS OF JAPAN

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(71)Applicant : **TAKUMI SEIKO:KK**

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(72)Inventor : **MARUYAMA EIJI**

### (54) PAPER FEEDING ROLLER

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a paper feeding roller stretching a wrinkle or distortion generated in paper.

SOLUTION: A first paper feeding part 2 formed into a roller shape is provided in an intermediate part 10 in the axial direction (a). A second paper feeding part 3 is provided spirally from the intermediate part 10 in the axial direction (a) to one end part 11 in the axial direction (a). A third paper feeding part 4 is provided spirally from the intermediate part 10 to the other end part 12 in the axial direction (a). The spiral directions of the second and third paper feeding units 3, 4 are opposite to each other in the vision from the one end part 11 side in the axial direction (a).

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## CLAIMS

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[Claim(s)]

[Claim 1] It is the paper feed roller characterized by providing the following. Said 1st paper feed section It is a roller-like and prepares for pars intermedia of shaft orientations. Said 2nd paper feed section It has spirally toward the end section of said shaft orientations from said pars intermedia of said shaft orientations. Said 3rd paper feed section It is the paper feed roller which it has spirally toward the other end of said shaft orientations from said pars intermedia of said shaft orientations, and the spiral direction of a volume looks at each of said 2nd paper feed section and said 3rd paper feed section from said end section of said shaft orientations, and is the reverse sense mutually. The 1st paper feed section The 2nd paper feed section The 3rd paper feed section

[Claim 2] It is the paper feed roller with pitch of said shaft orientations of said spiral are the paper feed roller indicated by claim 1, and almost same [ each of said 2nd paper feed section and said 3rd paper feed section ].

[Claim 3] The spiral starting point [ in / it is the paper feed roller indicated by any of claims 1 or 2 they are, and / in each of said 2nd paper feed section and said 3rd paper feed section / said pars intermedia of said shaft orientations ] is the paper feed roller located on the same plane containing a medial axis.

[Claim 4] It is the paper feed roller which is a paper feed roller indicated by claim 1 and by which said 1st paper feed section, said 2nd paper feed section, and said 3rd paper feed section are further supported with said base material including a base material.

[Claim 5] It is the paper feed roller which it is the paper feed roller indicated by claim 4, and said base material has a peripheral face of a circle configuration, and is constituted by said 1st paper feed section, said 2nd paper feed section, and said 3rd paper feed section twisting a sheet-like member around a peripheral face of said base material.

[Claim 6] Said 1st paper feed section, said 2nd paper feed section, and said 3rd paper feed section are a paper feed roller with a dynamic friction coefficient of the paper contact surface are the paper feed roller indicated by claim 5, and larger than a dynamic friction coefficient of a peripheral face of said base material.

[Claim 7] It is the paper feed roller which it is the paper feed roller indicated by claim 6, and said 1st paper feed section, said 2nd paper feed section, and said 3rd paper feed section become with polyurethane resin.

[Claim 8] It is the paper feed roller which it is the paper feed roller indicated by claim 7, and said base material becomes with the rigid body.

[Claim 9] It is the paper feed roller which it is the paper feed roller indicated by claim 7, and said base material becomes with an elastic body.

[Claim 10] It is the paper feed roller said base material, and whose said 1st paper feed section, said 2nd paper feed section and said 3rd paper feed section it is the paper feed roller indicated by claim 1, and are these bodies including a base material further.

[Claim 11] It is the paper feed roller which it is the paper feed roller indicated by claim 10, and said base material, said 1st paper feed section, said 2nd paper feed section, and said 3rd paper feed section become with polyurethane resin.

[Claim 12] It is paper feed equipment which has a paper feed roller. Said paper feed roller It comes to be what was indicated by any of claims 1-11 they are. Said paper feed roller When the direction of a volume of said spiral of the 2nd [ said ] paper feed section which saw from the end section of said shaft orientations is made into a clockwise rotation, Paper feed equipment by which sees from the end section of said shaft orientations, and a rotation drive is counterclockwise carried out, sees from the end section of said shaft orientations when the direction of a volume of said spiral of the 2nd [ said ] paper feed section which saw from the end section of said shaft orientations is made into a counterclockwise rotation, and a rotation drive is carried out clockwise.

## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to a paper feed roller and paper feed equipment.

[0002]

[Description of the Prior Art] A paper feed roller is used for OA equipment, such as a printer and facsimile, and has the function to send out a form. the wrinkle of the form generated in these OA equipment in the case of feeding and delivery, and a twist -- a blot of a character and a color -- fading -- etc. -- it becomes a cause. For this reason, in a paper feed roller, generating of the wrinkle of a form, a twist, etc. must be prevented certainly.

[0003] As a paper feed roller which aimed at corresponding to such a purpose, what is called crown Laura is already known. The paper feed roller of a crown Laura mold contains an axis-of-rotation object and a paper feed member. A paper feed member is a barrel shape with the bigger radius of gyration in the pars intermedia of the length direction than the radius of gyration in the both ends of the length direction, and the overall length of shaft orientations is continued and equipped with it around the axis-of-rotation object.

[0004] However, in case crown Laura is actually used for OA equipment, a big pressure is put on a paper feed roller for a paper feed member to stick to a form. Therefore, the pars intermedia of a paper feed member collapses and the meandering prevention function of the form which crown Laura has cannot fully be demonstrated. For this reason, there was a possibility that deviation might arise in the direction of paper feed.

[0005] And a form covers a crosswise overall length and is always pressed down with a paper feed roller. For this reason, when deviation arises in the direction of paper feed, it is impossible to correct a feed direction and it will once deviate [ original ] from a form greatly from paper feed. Furthermore, it is impossible to extend a wrinkle and to once return a twist, when a wrinkle, a twist, etc. occur in a form.

[0006]

[Problem(s) to be Solved by the Invention] The technical problem of this invention is offering the paper feed roller and paper feed equipment which can perform smoothness and quick paper feed actuation.

[0007] Another technical problem of this invention is offering the paper feed roller and paper feed equipment which can perform actuation which extends the wrinkle generated in the form, and a twist.

[0008]

[Means for Solving the Problem] In order to solve a technical problem mentioned above, a paper feed roller concerning this invention contains the 1st paper feed section, the 2nd paper feed section, and the 3rd paper feed section.

[0009] Said 1st paper feed section is a roller-like, and pars intermedia of shaft orientations is equipped with it.

[0010] It has said 2nd paper feed section spirally toward the end section of said shaft orientations from said pars intermedia of said shaft orientations.

[0011] It has said 3rd paper feed section spirally toward the other end of said shaft orientations from said pars intermedia of said shaft orientations.

[0012] The spiral direction of a volume looks at each of said 2nd paper feed section and said 3rd paper feed section from said end section of said shaft orientations, and it is the reverse sense mutually.

[0013] When the direction of a volume of said spiral of the 2nd [ said ] paper feed section which rotated a paper feed roller counterclockwise and saw from the end section of said shaft orientations when the direction of a volume of a spiral of the 2nd paper feed section which looked at it from the end section of shaft orientations when using a paper feed roller concerning this invention for OA equipment was made into a clockwise rotation is made into a counterclockwise rotation, it sees from the end section of said shaft orientations, and a rotation drive is carried out clockwise.

[0014] In this case, a paper feed roller concerning this invention is equipped with the 1st paper feed section, the 1st paper feed section is a roller-like, and pars intermedia of shaft orientations is equipped with it. When rotating a paper feed roller as mentioned above according to this structure, the 1st paper feed section rotates contacting pars intermedia of the cross direction of a form. Therefore, a paper feed operation of the same direction as a hand of cut is added to a form. For this reason, in pars intermedia of the cross direction of a form, a paper feed operation of the same direction as a hand of cut can be given to a form.

[0015] It has the 2nd paper feed section spirally toward the end section of shaft orientations from pars intermedia of shaft orientations. According to this structure, when rotating a paper feed roller as mentioned above, force of going to the end section of shaft orientations from pars intermedia of shaft orientations is applied to a form.

[0016] It has the 3rd paper feed section spirally toward the other end of shaft orientations from pars intermedia of shaft orientations. And the spiral direction of a volume looks at the 3rd paper feed section from the end section of shaft orientations, and the 2nd paper feed section is the reverse sense. According to this structure, when rotating a paper feed roller as mentioned above, force of going to the other end of shaft orientations from pars intermedia of shaft orientations is applied to a form.

[0017] As mentioned above, since force of going to the end section of shaft orientations

is given from pars intermedia of shaft orientations from the 2nd paper feed section to a form and force of going to the other end of pars intermedia of shaft orientations to shaft orientations gives to the 3rd paper feed section to a form, it will be pulled by form from both sides of the cross direction. For this reason, a wrinkle generated in a form is extended and a twist is canceled.

[0018] Furthermore, force of the same direction as a hand of cut is applied from the 2nd paper feed section and the 3rd paper feed section to a form, and a send operation of the same direction as a hand of cut is given to a form. Therefore, temporarily, even when deviation is produced in the direction of paper feed by the 1st paper feed section, in both sides of the 1st paper feed section, a feed direction corrective action by the 2nd paper feed section and the 3rd paper feed section is added. For this reason, a form can be sent smoothly and quickly, without original deviating from paper feed.

[0019] Still more concrete feature and advantage of this invention are explained still more concretely with reference to a drawing.

[0020]

[Embodiment of the Invention] The front view and drawing 2 which show the paper feed roller which drawing 1 requires for this invention are the cross section of the shaft orientations of drawing 1. As shown in drawing 1, a paper feed roller contains the 1st paper feed section 2, the 2nd paper feed section 3, and the 3rd paper feed section 4. The 1st paper feed section 2 is a roller-like, and the pars intermedia 10 of shaft orientations a is equipped with it.

[0021] It has the 2nd paper feed section 3 spirally toward the end section 11 of shaft orientations a from the pars intermedia 10 of shaft orientations a. It has the 3rd paper feed section 4 spirally toward the other end 12 of shaft orientations a from the pars intermedia 10 of shaft orientations a. The spiral direction of a volume looks at each of the 2nd paper feed section 3 and the 3rd paper feed section 4 from the end section 11 of shaft orientations a, and it is the reverse sense mutually. In the example, it sees from the end section 11 side, and the 2nd paper feed section 3 is formed as a clockwise spiral, and the 3rd paper feed section 3 is seen from the end section 11 side, and is formed as a counterclockwise spiral.

[0022] The plan where drawing 2 explains actuation of the paper feed roller in a busy condition, drawing 3 - drawing 5 are the front view explaining actuation of the paper feed roller in a busy condition.

[0023] In case a paper feed roller is built into paper feed equipment and is actually used for OA equipment, the direction of a volume of the spiral of the 2nd paper feed section 3 sees from the end section 11 of shaft orientations a, and, as for the case of a clockwise rotation, a paper feed roller is rotated counterclockwise. When the direction of a volume of the spiral of the 2nd paper feed section 3 is a counterclockwise rotation, a paper feed roller is rotated clockwise. Hereafter, it sees from the end section 11 of shaft orientations a, and the direction of a volume of the spiral of the 2nd paper feed section 3 is a clockwise rotation, and explains as what rotates a paper feed roller counterclockwise.

[0024] As mentioned above, the 1st paper feed section 2 is a roller-like, and the pars intermedia 10 of shaft orientations a is equipped with it. When rotating a paper feed roller as mentioned above according to this structure, the 1st paper feed section 2 rotates contacting the pars intermedia 50 of the cross direction W of a form 5. Therefore, the turning effort F22 of the same direction as a hand of cut c is applied to a form 5. For this

reason, in the pars intermedia 50 of the cross direction W of a form 5, paper feed actuation can be given in the same direction as a hand of cut c to a form 5.

[0025] Next, it has the 2nd paper feed section 3 spirally toward the end section 11 of shaft orientations a from the pars intermedia 10 of shaft orientations a. According to this structure, when rotating a paper feed roller as mentioned above, the force F31 of going to the end 51 of shaft orientations a from the pars intermedia 50 of shaft orientations a is applied to a form 5.

[0026] Moreover, it has the 3rd paper feed section 4 spirally toward the other end 41 of shaft orientations a from the pars intermedia 40 of shaft orientations a. And the spiral direction of a volume looks at each of the 2nd paper feed section 3 and the 3rd paper feed section 4 from the end section 11 of shaft orientations a, and it is the reverse sense mutually. According to this structure, when rotating a paper feed roller as mentioned above, the force F41 of going to the other end 52 of shaft orientations a from the pars intermedia 50 of shaft orientations a is applied to a form 5.

[0027] As mentioned above, since the force F31 of going to the end section 11 of shaft orientations a is given from the pars intermedia 10 of shaft orientations a from the 2nd paper feed section 3 to a form 5 and the force F41 of going to the other end 12 of shaft orientations a is given from the pars intermedia 10 of shaft orientations a from the 3rd paper feed section 4 to a form 5, it will be pulled by the form 5 from the both sides of the cross direction. For this reason, the wrinkle generated in the form 5 is extended and a twist is canceled.

[0028] And the turning effort F32 and F42 of the same direction as a hand of cut c is given to a form 5 from the 2nd paper feed section 3 and the 3rd paper feed section 4. Therefore, temporarily, even when deviation is produced in the direction of paper feed by the force F22 of the 1st paper feed section 2, in the both sides of the 1st paper feed section 2, the feed direction corrective action by the 2nd paper feed section 3 and the 3rd paper feed section 4 is added. For this reason, a form 5 can be sent smoothly and quickly, without original deviating from paper feed.

[0029] In this example, it is the pitch L with the pitch of shaft orientations a same [ each of the 2nd paper feed section 3 and the 3rd paper feed section 4 ] (refer to drawing 1 ). According to this structure, the magnitude of the force F31 and the magnitude of the force F32 become equal. Therefore, the force of the same magnitude works to the reverse sense of shaft orientations at the both-ends side of the cross direction W of a form 5. For this reason, a wrinkle and dissolution actuation of a twist improve.

[0030] Moreover, according to this structure, the magnitude of the force F41 and the magnitude of the force F42 become equal. It follows, therefore the force of the same magnitude works in the same direction as a hand of cut c to the both-ends side of the cross direction W of a form 5. For this reason, a feed direction corrective action improves.

[0031] Furthermore, in this example, it is located in the pars intermedia of shaft orientations a on the same plane (not shown) where the starting point 30 of the 2nd paper feed section 3 and the starting point 40 of the 3rd paper feed section 4 contain the axis O of a base material 1 (refer to drawing 1 ). For this reason, the force of the same magnitude works in a direction a1 and the direction a2 to the same timing to a form 5. For this reason, the paper feed roller excellent in a feed direction corrective action, a wrinkle, and dissolution actuation of a twist is obtained.

[0032] Drawing 6 is the cross section showing the still more concrete example of the paper feed roller concerning this invention. As shown in drawing 6, a paper feed roller contains a base material 1. The 1st paper feed section 2, the 2nd paper feed section 3, and the 3rd paper feed section 4 are supported by the base material 1. According to this structure, it becomes possible to constitute a base material 1, and the 1st paper feed section 2, the 2nd paper feed section 3 and the 3rd paper feed section 4 from the different quality of the material. A spring material or plastic material, such as the rigid bodies, such as a metal, and rubber, etc. can constitute a base material 1.

[0033] If it takes into consideration the slipping hard of the form in the case of the adhesion and paper feed to a form, the 1st paper feed section 2, the 2nd paper feed section 3, and the 3rd paper feed section 4 must have the dynamic friction coefficient of the paper contact surface larger than the dynamic friction coefficient of the peripheral face of a base material 1. As the quality of the material which constitutes the 1st paper feed section 2, the 2nd paper feed section 3, and the 3rd paper feed section 4, polyurethane resin etc. is mentioned, for example. In the case of polyurethane resin, even when a spring material or plastic material, such as the rigid bodies, such as a metal, and rubber, etc. constitutes a base material 1, this bigger coefficient of friction than it can be secured.

[0034] In the example shown in drawing 6, a base material 1 has the peripheral face of a circle configuration. The 1st paper feed section 2, the 2nd paper feed section 3, and the 3rd paper feed section 4 are twisted around the peripheral face of a base material 1, and the sheet-like member is constituted. According to this structure, processing is easy and the paper feed roller excellent in productivity is obtained. As a member of the shape of a sheet which constitutes the 1st paper feed section 2, the 2nd paper feed section 3, and the 3rd paper feed section 4, a polyurethane resin sheet is desirable.

[0035] Furthermore, a base material 1 contains the axis of rotation 131 and a supporter 132. The axis of rotation 131 becomes with the rigid bodies, such as a metal. A supporter 132 is supported with the axis of rotation 131. In the example, although the overall length of the shaft orientations of a paper feed roller is continued and equipped with the axis of rotation 131, only the both ends of the shaft orientations of a paper feed roller may be equipped with it.

[0036] In case a paper feed roller is used for OA equipment as already stated, a big pressure is put on a paper feed roller for the paper feed section to stick to a form. In a base material 1, the quality of the material of a supporter 132 can be changed into arbitration corresponding to the strength of this pressure. When a pressure is weak, a supporter 132 becomes with the rigid bodies, such as iron and aluminum.

[0037] When a pressure is strong, a supporter 132 becomes with an elastic body with a dynamic friction coefficient smaller than polyurethane resin. According to this structure, the area in contact with a form increases in the case of paper feed. Therefore, more positive paper feed becomes possible according to the synergistic effect with the 1st paper feed section 2, the 2nd paper feed section 3, and the 3rd paper feed section 4 which become with polyurethane resin.

[0038] Drawing 7 is the cross section of shaft orientations showing another example of the paper feed roller concerning this invention. The same component as the component shown in drawing 1 attaches the same reference mark, and explanation is omitted. The feature of the example shown in drawing 7 is that a base material 1, and the 1st paper

feed section 2, the 2nd paper feed section 3 and the 3rd paper feed section 4 are these bodies.

[0039] A base material 1, the 1st paper feed section 2, the 2nd paper feed section 3, and the 3rd paper feed section 4 consist of elastic bodies, such as polyurethane resin.

According to this structure, the area in contact with a form increases in the case of paper feed. Therefore, more positive paper feed becomes possible according to the synergistic effect with the 1st paper feed section 2, the 2nd paper feed section 3, and the 3rd paper feed section 4 which become with polyurethane resin.

[0040] The 1st paper feed section 2, the 2nd paper feed section 3, and the 3rd paper feed section 4 consist of polyurethane resin etc. Since polyurethane resin is a material with a big dynamic friction coefficient, the paper feed roller excellent in the adhesion over a form 5 is obtained.

[0041]

[Effect of the Invention] According to this invention, the following effects can be acquired as stated above.

(a) The paper feed roller which can perform smoothness and quick paper feed actuation can be offered.

(b) The paper feed roller which can perform actuation which extends the wrinkle generated in the form and a twist can be offered.

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## TECHNICAL FIELD

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[The technical field to which invention belongs] This invention relates to a paper feed roller and paper feed equipment.

## PRIOR ART

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[Description of the Prior Art] A paper feed roller is used for OA equipment, such as a printer and facsimile, and has the function to send out a form. the wrinkle of the form generated in these OA equipment in the case of feeding and delivery, and a twist -- a blot of a character and a color -- fading -- etc. -- it becomes a cause. For this reason, in a paper feed roller, generating of the wrinkle of a form, a twist, etc. must be prevented certainly.

[0003] As a paper feed roller which aimed at corresponding to such a purpose, what is called crown Laura is already known. The paper feed roller of a crown Laura mold contains an axis-of-rotation object and a paper feed member. A paper feed member is a barrel shape with the bigger radius of gyration in the pars intermedia of the length direction than the radius of gyration in the both ends of the length direction, and the overall length of shaft orientations is continued and equipped with it around the axis-of-rotation object.

[0004] However, in case crown Laura is actually used for OA equipment, a big pressure is put on a paper feed roller for a paper feed member to stick to a form. Therefore, the pars intermedia of a paper feed member collapses and the meandering prevention function of the form which crown Laura has cannot fully be demonstrated. For this reason, there was a possibility that deviation might arise in the direction of paper feed.



[0005] And a form covers a crosswise overall length and is always pressed down with a paper feed roller. For this reason, when deviation arises in the direction of paper feed, it is impossible to correct a feed direction and it will once deviate [ original ] from a form greatly from paper feed. Furthermore, it is impossible to extend a wrinkle and to once return a twist, when a wrinkle, a twist, etc. occur in a form.

## EFFECT OF THE INVENTION

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[Effect of the Invention] According to this invention, the following effects can be acquired as stated above.

- (a) The paper feed roller which can perform smoothness and quick paper feed actuation can be offered.
- (b) The paper feed roller which can perform actuation which extends the wrinkle generated in the form and a twist can be offered.

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## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] The technical problem of this invention is offering the paper feed roller and paper feed equipment which can perform smoothness and quick paper feed actuation.

[0007] Another technical problem of this invention is offering the paper feed roller and paper feed equipment which can perform actuation which extends the wrinkle generated in the form, and a twist.

## MEANS

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[Means for Solving the Problem] In order to solve a technical problem mentioned above, a paper feed roller concerning this invention contains the 1st paper feed section, the 2nd paper feed section, and the 3rd paper feed section.

[0009] Said 1st paper feed section is a roller-like, and pars intermedia of shaft orientations is equipped with it.

[0010] It has said 2nd paper feed section spirally toward the end section of said shaft orientations from said pars intermedia of said shaft orientations.

[0011] It has said 3rd paper feed section spirally toward the other end of said shaft orientations from said pars intermedia of said shaft orientations.

[0012] The spiral direction of a volume looks at each of said 2nd paper feed section and said 3rd paper feed section from said end section of said shaft orientations, and it is the reverse sense mutually.

[0013] When the direction of a volume of said spiral of the 2nd [ said ] paper feed section which rotated a paper feed roller counterclockwise and saw from the end section of said shaft orientations when the direction of a volume of a spiral of the 2nd paper feed section which looked at it from the end section of shaft orientations when using a paper feed

roller concerning this invention for OA equipment was made into a clockwise rotation is made into a counterclockwise rotation, it sees from the end section of said shaft orientations, and a rotation drive is carried out clockwise.

[0014] In this case, a paper feed roller concerning this invention is equipped with the 1st paper feed section, the 1st paper feed section is a roller-like, and pars intermedia of shaft orientations is equipped with it. When rotating a paper feed roller as mentioned above according to this structure, the 1st paper feed section rotates contacting pars intermedia of the cross direction of a form. Therefore, a paper feed operation of the same direction as a hand of cut is added to a form. For this reason, in pars intermedia of the cross direction of a form, a paper feed operation of the same direction as a hand of cut can be given to a form.

[0015] It has the 2nd paper feed section spirally toward the end section of shaft orientations from pars intermedia of shaft orientations. According to this structure, when rotating a paper feed roller as mentioned above, force of going to the end section of shaft orientations from pars intermedia of shaft orientations is applied to a form.

[0016] It has the 3rd paper feed section spirally toward the other end of shaft orientations from pars intermedia of shaft orientations. And the spiral direction of a volume looks at the 3rd paper feed section from the end section of shaft orientations, and the 2nd paper feed section is the reverse sense. According to this structure, when rotating a paper feed roller as mentioned above, force of going to the other end of shaft orientations from pars intermedia of shaft orientations is applied to a form.

[0017] As mentioned above, since force of going to the end section of shaft orientations is given from pars intermedia of shaft orientations from the 2nd paper feed section to a form and force of going to the other end of pars intermedia of shaft orientations to shaft orientations gives to the 3rd paper feed section to a form, it will be pulled by form from both sides of the cross direction. For this reason, a wrinkle generated in a form is extended and a twist is canceled.

[0018] Furthermore, force of the same direction as a hand of cut is applied from the 2nd paper feed section and the 3rd paper feed section to a form, and a send operation of the same direction as a hand of cut is given to a form. Therefore, temporarily, even when deviation is produced in the direction of paper feed by the 1st paper feed section, in both sides of the 1st paper feed section, a feed direction corrective action by the 2nd paper feed section and the 3rd paper feed section is added. For this reason, a form can be sent smoothly and quickly, without original deviating from paper feed.

[0019] Still more concrete feature and advantage of this invention are explained still more concretely with reference to a drawing.

[0020]

[Embodiment of the Invention] The front view and drawing 2 which show the paper feed roller which drawing 1 requires for this invention are the cross section of the shaft orientations of drawing 1. As shown in drawing 1, a paper feed roller contains the 1st paper feed section 2, the 2nd paper feed section 3, and the 3rd paper feed section 4. The 1st paper feed section 2 is a roller-like, and the pars intermedia 10 of shaft orientations a is equipped with it.

[0021] It has the 2nd paper feed section 3 spirally toward the end section 11 of shaft orientations a from the pars intermedia 10 of shaft orientations a. It has the 3rd paper feed section 4 spirally toward the other end 12 of shaft orientations a from the pars intermedia

10 of shaft orientations a. The spiral direction of a volume looks at each of the 2nd paper feed section 3 and the 3rd paper feed section 4 from the end section 11 of shaft orientations a, and it is the reverse sense mutually. In the example, it sees from the end section 11 side, and the 2nd paper feed section 3 is formed as a clockwise spiral, and the 3rd paper feed section 3 is seen from the end section 11 side, and is formed as a counterclockwise spiral.

[0022] The plan where drawing 2 explains actuation of the paper feed roller in a busy condition, drawing 3 - drawing 5 are the front view explaining actuation of the paper feed roller in a busy condition.

[0023] In case a paper feed roller is built into paper feed equipment and is actually used for OA equipment, the direction of a volume of the spiral of the 2nd paper feed section 3 sees from the end section 11 of shaft orientations a, and, as for the case of a clockwise rotation, a paper feed roller is rotated counterclockwise. When the direction of a volume of the spiral of the 2nd paper feed section 3 is a counterclockwise rotation, a paper feed roller is rotated clockwise. Hereafter, it sees from the end section 11 of shaft orientations a, and the direction of a volume of the spiral of the 2nd paper feed section 3 is a clockwise rotation, and explains as what rotates a paper feed roller counterclockwise.

[0024] As mentioned above, the 1st paper feed section 2 is a roller-like, and the pars intermedia 10 of shaft orientations a is equipped with it. When rotating a paper feed roller as mentioned above according to this structure, the 1st paper feed section 2 rotates contacting the pars intermedia 50 of the cross direction W of a form 5. Therefore, the turning effort F22 of the same direction as a hand of cut c is applied to a form 5. For this reason, in the pars intermedia 50 of the cross direction W of a form 5, paper feed actuation can be given in the same direction as a hand of cut c to a form 5.

[0025] Next, it has the 2nd paper feed section 3 spirally toward the end section 11 of shaft orientations a from the pars intermedia 10 of shaft orientations a. According to this structure, when rotating a paper feed roller as mentioned above, the force F31 of going to the end 51 of shaft orientations a from the pars intermedia 50 of shaft orientations a is applied to a form 5.

[0026] Moreover, it has the 3rd paper feed section 4 spirally toward the other end 41 of shaft orientations a from the pars intermedia 40 of shaft orientations a. And the spiral direction of a volume looks at each of the 2nd paper feed section 3 and the 3rd paper feed section 4 from the end section 11 of shaft orientations a, and it is the reverse sense mutually. According to this structure, when rotating a paper feed roller as mentioned above, the force F41 of going to the other end 52 of shaft orientations a from the pars intermedia 50 of shaft orientations a is applied to a form 5.

[0027] As mentioned above, since the force F31 of going to the end section 11 of shaft orientations a is given from the pars intermedia 10 of shaft orientations a from the 2nd paper feed section 3 to a form 5 and the force F41 of going to the other end 12 of shaft orientations a is given from the pars intermedia 10 of shaft orientations a from the 3rd paper feed section 4 to a form 5, it will be pulled by the form 5 from the both sides of the cross direction. For this reason, the wrinkle generated in the form 5 is extended and a twist is canceled.

[0028] And the turning effort F32 and F42 of the same direction as a hand of cut c is given to a form 5 from the 2nd paper feed section 3 and the 3rd paper feed section 4. Therefore, temporarily, even when deviation is produced in the direction of paper feed by

the force F22 of the 1st paper feed section 2, in the both sides of the 1st paper feed section 2, the feed direction corrective action by the 2nd paper feed section 3 and the 3rd paper feed section 4 is added. For this reason, a form 5 can be sent smoothly and quickly, without original deviating from paper feed.

[0029] In this example, it is the pitch L with the pitch of shaft orientations a same [ each of the 2nd paper feed section 3 and the 3rd paper feed section 4 ] (refer to drawing 1 ). According to this structure, the magnitude of the force F31 and the magnitude of the force F32 become equal. Therefore, the force of the same magnitude works to the reverse sense of shaft orientations at the both-ends side of the cross direction W of a form 5. For this reason, a wrinkle and dissolution actuation of a twist improve.

[0030] Moreover, according to this structure, the magnitude of the force F41 and the magnitude of the force F42 become equal. It follows, therefore the force of the same magnitude works in the same direction as a hand of cut c to the both-ends side of the cross direction W of a form 5. For this reason, a feed direction corrective action improves.

[0031] Furthermore, in this example, it is located in the pars intermedia of shaft orientations a on the same plane (not shown) where the starting point 30 of the 2nd paper feed section 3 and the starting point 40 of the 3rd paper feed section 4 contain the axis O of a base material 1 (refer to drawing 1 ). For this reason, the force of the same magnitude works in a direction a1 and the direction a2 to the same timing to a form 5. For this reason, the paper feed roller excellent in a feed direction corrective action, a wrinkle, and dissolution actuation of a twist is obtained.

[0032] Drawing 6 is the cross section showing the still more concrete example of the paper feed roller concerning this invention. As shown in drawing 6 , a paper feed roller contains a base material 1. The 1st paper feed section 2, the 2nd paper feed section 3, and the 3rd paper feed section 4 are supported by the base material 1. According to this structure, it becomes possible to constitute a base material 1, and the 1st paper feed section 2, the 2nd paper feed section 3 and the 3rd paper feed section 4 from the different quality of the material. A spring material or plastic material, such as the rigid bodies, such as a metal, and rubber, etc. can constitute a base material 1.

[0033] If it takes into consideration the slipping hard of the form in the case of the adhesion and paper feed to a form, the 1st paper feed section 2, the 2nd paper feed section 3, and the 3rd paper feed section 4 must have the dynamic friction coefficient of the paper contact surface larger than the dynamic friction coefficient of the peripheral face of a base material 1. As the quality of the material which constitutes the 1st paper feed section 2, the 2nd paper feed section 3, and the 3rd paper feed section 4, polyurethane resin etc. is mentioned, for example. In the case of polyurethane resin, even when a spring material or plastic material, such as the rigid bodies, such as a metal, and rubber, etc. constitutes a base material 1, this bigger coefficient of friction than it can be secured.

[0034] In the example shown in drawing 6 , a base material 1 has the peripheral face of a circle configuration. The 1st paper feed section 2, the 2nd paper feed section 3, and the 3rd paper feed section 4 are twisted around the peripheral face of a base material 1, and the sheet-like member is constituted. According to this structure, processing is easy and the paper feed roller excellent in productivity is obtained. As a member of the shape of a sheet which constitutes the 1st paper feed section 2, the 2nd paper feed section 3, and the

3rd paper feed section 4, a polyurethane resin sheet is desirable.

[0035] Furthermore, a base material 1 contains the axis of rotation 131 and a supporter 132. The axis of rotation 131 becomes with the rigid bodies, such as a metal. A supporter 132 is supported with the axis of rotation 131. In the example, although the overall length of the shaft orientations of a paper feed roller is continued and equipped with the axis of rotation 131, only the both ends of the shaft orientations of a paper feed roller may be equipped with it.

[0036] In case a paper feed roller is used for OA equipment as already stated, a big pressure is put on a paper feed roller for the paper feed section to stick to a form. In a base material 1, the quality of the material of a supporter 132 can be changed into arbitration corresponding to the strength of this pressure. When a pressure is weak, a supporter 132 becomes with the rigid bodies, such as iron and aluminum.

[0037] When a pressure is strong, a supporter 132 becomes with an elastic body with a dynamic friction coefficient smaller than polyurethane resin. According to this structure, the area in contact with a form increases in the case of paper feed. Therefore, more positive paper feed becomes possible according to the synergistic effect with the 1st paper feed section 2, the 2nd paper feed section 3, and the 3rd paper feed section 4 which become with polyurethane resin.

[0038] Drawing 7 is the cross section of shaft orientations showing another example of the paper feed roller concerning this invention. The same component as the component shown in drawing 1 attaches the same reference mark, and explanation is omitted. The feature of the example shown in drawing 7 is that a base material 1, and the 1st paper feed section 2, the 2nd paper feed section 3 and the 3rd paper feed section 4 are these bodies.

[0039] A base material 1, the 1st paper feed section 2, the 2nd paper feed section 3, and the 3rd paper feed section 4 consist of elastic bodies, such as polyurethane resin.

According to this structure, the area in contact with a form increases in the case of paper feed. Therefore, more positive paper feed becomes possible according to the synergistic effect with the 1st paper feed section 2, the 2nd paper feed section 3, and the 3rd paper feed section 4 which become with polyurethane resin.

[0040] The 1st paper feed section 2, the 2nd paper feed section 3, and the 3rd paper feed section 4 consist of polyurethane resin etc. Since polyurethane resin is a material with a big dynamic friction coefficient, the paper feed roller excellent in the adhesion over a form 5 is obtained.

[0041]

## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the front view showing the paper feed roller concerning this invention.

[Drawing 2] It is a plan explaining actuation of the paper feed equipment using the paper feed roller shown in drawing 1.

[Drawing 3] It is the front view explaining actuation of the paper feed equipment shown in drawing 2.

[Drawing 4] It is the front view explaining actuation of the paper feed equipment shown in drawing 2 .

[Drawing 5] It is the front view explaining actuation of the paper feed equipment shown in drawing 2 .

[Drawing 6] It is the cross section showing another example of the paper feed roller concerning this invention.

[Drawing 7] It is the cross section showing still more nearly another example of the paper feed roller concerning this invention.

[Description of Notations]

1 Base Material

2 1st Paper Feed Section

3 2nd Paper Feed Section

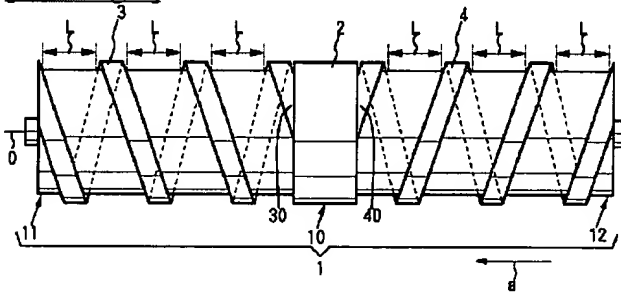
4 3rd Paper Feed Section

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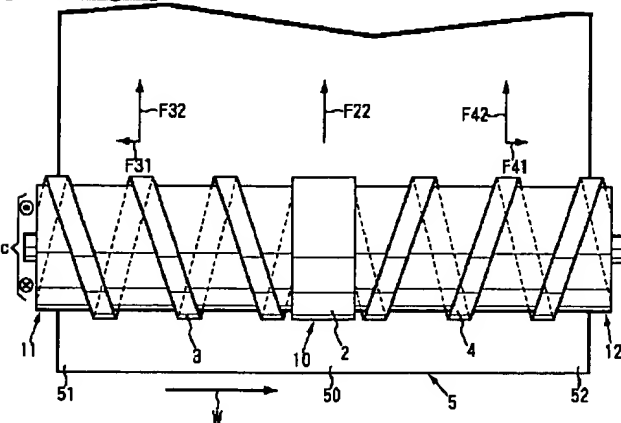
## DRAWINGS

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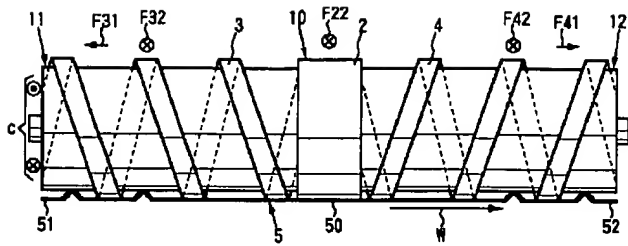
[Drawing 1]



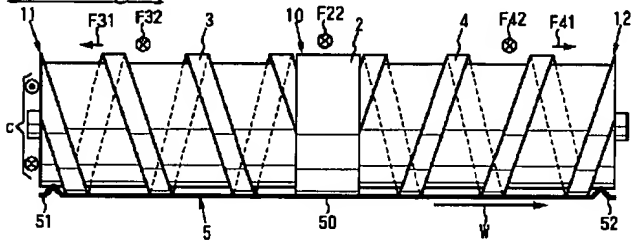
[Drawing 2]



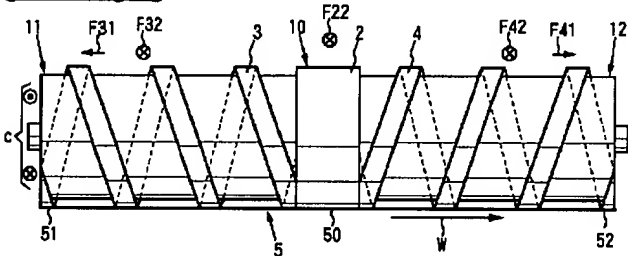
[Drawing 3]



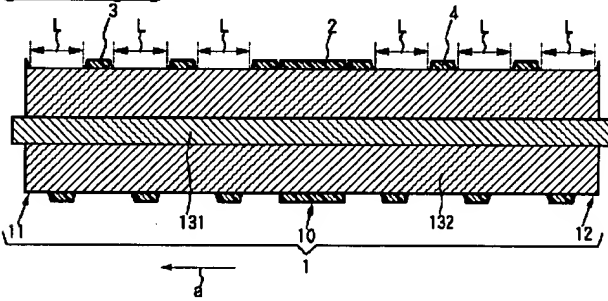
[Drawing 4]



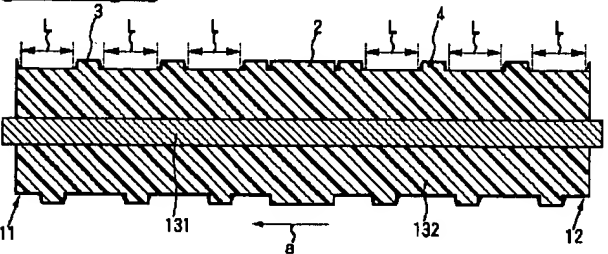
[Drawing 5]



[Drawing 6]



[Drawing 7]



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